

Higher Order (Shortcut), Trig Derivatives

For each problem, find the indicated derivative with respect to x .

1) $f(x) = 3x^5 - 5x^4 + 5x^3$ Find f''

$$f' = 15x^4 - 20x^3 + 15x^2$$

$$f'' = 60x^3 - 60x^2 + 30x$$

2) $y = 3x^3 + 3x^2 + 4x$ Find $\frac{d^4y}{dx^4}$

$$\frac{d^4y}{dx^4} = 0$$

3) $f(x) = 4x^3$ Find f''

$$f' = 12x^2$$

$$f'' = 24x$$

4) $f(x) = 3x^{-1} - \frac{1}{x^2}$ Find $f^{(4)}$

$$f^{(4)} = \frac{72}{x^5} - \frac{120}{x^6}$$

5) $y = x^2$ Find $\frac{d^3y}{dx^3}$

$$y' = 2x$$

$$y'' = 2$$

$$y''' = 0$$

6) $f(x) = 4x^{\frac{1}{4}} + \frac{4}{x^4}$ Find $f^{(4)}$

$$f^{(4)} = \frac{231}{64x^{15/4}} + \frac{3360}{x^8}$$
$$= \frac{231}{64\sqrt[4]{x^{15}}} + \frac{3360}{x^8}$$

Differentiate each function with respect to x .

7) $y = 3\cos x$

$$-3\sin x$$

8) $f(x) = \cos x - \sin x$

$$-\sin x - \cos x$$

9) $f(x) = -5\cot x$

$$+5\csc^2(x)$$

10) $y = \sin x - \tan x$

$$\cos x - \sec^2 x$$

11) $f(x) = \tan x - 7$

$$\sec^2 x$$

12) $y = \sec x + 3\csc x$

$$\sec(x) + \tan(x) - 3\csc(x)\cot(x)$$